

Earth Science

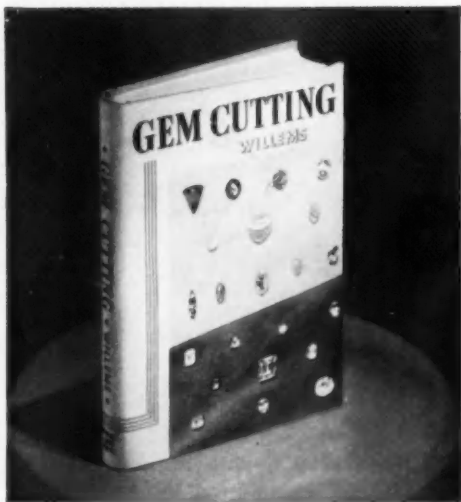
Rockhounds' NATIONAL Magazine



Christmas Day in the Colorado Mountains

35¢

November-December, 1955



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Dr. Willems' book "Gem Cutting" is a standard text for amateurs following in his footsteps.—Medical Economics.

The author is an accomplished amateur lapidary, and the book is based chiefly upon his experience. Facet cutting is well described. There are excellent illustrations. The printing and production are excellent and the book is modestly priced.—The Gemologist.

The book is of incontestable value to make cutting easy.—Technica.

Certainly this book makes the art of gem cutting easily understandable whether one has previous technical knowledge or not. The step by step drawings and photographs enable the beginner to become a better craftsman.—Newsletter of State Mineral Society of Texas.

"Gem Cutting" is by far the best written introduction to the craft of cutting precious stones. It offers a long and detailed explanation of the methods for cutting facets, the most comprehensive available to the amateur.—Chicago Tribune.

A very attractive book, which explains in detail how the amateur can construct his own simple lapidary equipment and fashion rough stones into cabochon cuts, and into multi-faceted gems.—St. Louis Post-Dispatch.

From cover to cover your book is tops.—Adam Arthur Kahn, Professional Lapidary.

So accurate and clear in detail are the step-by-step drawings of facet planning and cutting that any enthusiastic beginner can follow them and become a fine craftsman in a short time.—The American Horologist and Jeweler.

The book is a fine example of a detailed, practical work showing all the steps necessary, all of the cutting shapes which are possible, the equipment and the techniques. The author is to be congratulated upon having done an excellent job. — Jewelers' Circular-Key-stone.

The book is clearly written and each important step is illustrated. A most useful manual of instruction.—Los Angeles Times.

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EDITOR'S MEMO PAD

Are you perplexed about Christmas? Most folks are, or will be at this time of the year, whether they admit it or not. This is the season when we are grasping about for ideas concerning what best to give to our friends and relations for Christmas. We are trying to think of some appropriate token of friendship or esteem, which may be appreciated and enjoyed by the recipient, not so much, perhaps, for its intrinsic value, as for, shall we say, the sentiment with the gift.

Seriously, may we make a few good suggestions, but first hasten to say that this is not a selling campaign in any sense of the word. We are simply making an honest endeavor to aid you, our readers, at this critical period, when so many good fellows soon figuratively will be tearing their hair out and racking their brains, while attempting to solve this personal problem.

Have you thought of some type of an earth science hobby gift, something which will last for a lifetime, and yet possibly be both useful and ornamental? Here, then, is perhaps the solution for your problem. With a little thought you may be able to select some object which will fit both the occasion and the purse. Perhaps you will select a nice piece of craft jewelry—earrings, locket or whatnot for Mom or Sister; some piece of lapidary equipment or some good cutting material for Father or Uncle; or a nice box of representative mineral specimens for Johnny. Your good friend might appreciate a good mineral book, or some rare specimen which he has always wanted, but never thought he could afford. And so on down the line.

Should you wish to make a gift which would come as a constant reminder of your friendship throughout the entire year, nothing could serve the purpose better than a one or a three year subscription to EARTH SCIENCE, or some one or more of the other fine journals published in this field. And in so doing you would also be making a gesture which would be much appreciated by the publishers of the magazine as well.

Why not send a complimentary subscription while you are at it, to your public or high school library, or to the library of your college alma mater? One fine club that we know of already has placed the magazine on the reading table of every library in their county. Really now, what could be finer?

Then there always comes the matter of a suitable Christmas program for the club, which will be in keeping with the true holiday spirit. This is a season when most people are so preoccupied with many other duties and responsibilities that they are scarcely in the mood for study.

Many clubs have found this to be a fine time to relax with simply a party or tea and a social time, and we have no better suggestion for decoration than a lovely Christmas tree festooned with lights and all the innumerable kinds of lapidary art, jewelry, etc., from the shops of the various members. This has been tried out by many societies in the past and found to be a most delightful way in which to commemorate the Christmas season.

In Memoriam



CHARLES H. PRESTON, 1876-1955

We greatly regret that this picture of Mr. Preston was not received in time to be included with the memorial notice of him in our last issue.

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Reviews

We would like to recommend the "Mineral & Rocks Calendar—1956," published by Benjamin M. Shaub, of Northampton, Massachusetts, as a splendid Christmas gift for mineral minded friends. It is especially purposeful for its educational value, as the 52 full page (one for each week) mineral pictures are of high quality and together with the concise thumb-nail description for each will add greatly to one's fund of mineralogical knowledge.

*

In keeping with the season, our cover picture is a scene in Turkey Creek Canyon in Indian Hills, Colorado, snapped on a typical Christmas day. Dark green trees, sparkling white snow, blue sky, fleecy white clouds, craggy mountains—what an ideal place for the Christmas holidays! Skiing, tobogganing, hiking—one is invigorated and happy to be alive, a feeling seemingly shared even by the squirrels that leap from tree to tree seeking food so carefully stored for the long winter. In the evening the bright moon rising above the mountain casts a spell of enchantment over the winding forest road. Here in the heart of the Rockies one is attuned to the spirit of Christmas.—W.H.A.

*

Authors

LLOYD H. SPRINKLE, of Livonia, Michigan, is both a distinguished scholar in the field of optics and a master practitioner of the optician's art. It will be a privilege to publish his paper given at the Midwest convention at Detroit . . . MRS. JULIAN WETHERBEE is an authority on the mining lore of her home state of New Hampshire, and resides at Keene, where she says she enjoys calls from visiting rockhounds . . . HERBERT B. NICHOLS is a research reporter for General Electric. His report on the artificial production of diamonds has been slightly abridged by the editor, who would like to inject this bit of comment. Isn't it fine to live in a country where many great industries like the General Electric are able and willing to spend millions of dollars upon pure research, which in the end must undoubtedly, either directly or indirectly, benefit all of our people. In this way they are able to accomplish what no one individual, however diligent or ingenious, could ever possibly do alone. A single rockhound might go out and discover a very valuable deposit of uranium ore, but without capital to mine, refine and utilize such material his discovery would of course remain valueless . . . DAVID C. BROWN is a junior member of the Nebraska Mineral and Gem Club, of Omaha, and his remarkable contribution proves what we said in the last issue on the advantages of encouraging juniors. He made his noteworthy fossil fish find at the age of fourteen . . . E. B. DYKES BEACHY is associated with the chamber of commerce at Greensburg, Kansas, which is planning to erect a shelter house and museum at the site of the great dug-well that is a heritage of the city.

—BEN HUR WILSON, *Editor*

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* * *

Two Invaluable Reference Books for Every "Rockhound"

MINERALS FOR ATOMIC ENERGY

Robert D. Nininger

Written by the Atomic Energy Commission's Assistant Director for Exploration, this new book (published late in 1954) is a complete handbook to prospecting for atomic energy minerals.

GEM CUTTING: A LAPIDARY'S MANUAL

John Sinkankas

A thorough handbook of gemology, this October 1955 publication tells how to prospect for gem stones; prepare, shape and facet stones; select, use and care for tools; and design and make jewelry.

D. VAN NOSTRAND COMPANY, INC.

120 Alexander Street

Princeton, New Jersey

Great Hand-Dug Well Recalls The Rush To Settle Western Kansas In The 1880's

by E. B. DYKES BEACHY

GREENSBURG, KANSAS—in the heart of the Mid-Western prairies in Kiowa County, has long boasted of having the world's largest hand-dug well.

Construction of the well began in the boom days of 1887 and it was completed the following year. The great excavation, 32 feet in diameter and 109 feet deep, was cased with native stone. With great difficulty the stone was hauled over new, unmarked prairie roads from quarries along the Medicine River about twelve miles from Greensburg.

Recently, the state and federal geological survey office at Kansas University has learned that the Greensburg well must take second place; there is a man-made well in Orvieto, Italy, that is 42 feet in diameter and 200 feet deep. This news is a great disappointment to the citizens of Greensburg, who advertise the well to travelers crossing Kansas on U.S. highway No. 54. But they still can claim top rank for the United States.

What is the story behind this gigantic hand-dug well in Kiowa County, Kansas? For almost twenty-five years following the Civil war, Southwestern Kansas remained a wild frontier, which settlers shunned because of dust storms, prairie fires and other hazards. Then came "ten wonderful years" with no dust storms and only one trying summer, 1874, when August brought a grasshopper invasion. Excited by the ten wonderful years and the fact that the government was offering the "last free land of any value," homesteaders began to migrate to Southwestern Kansas. The buffalo, were

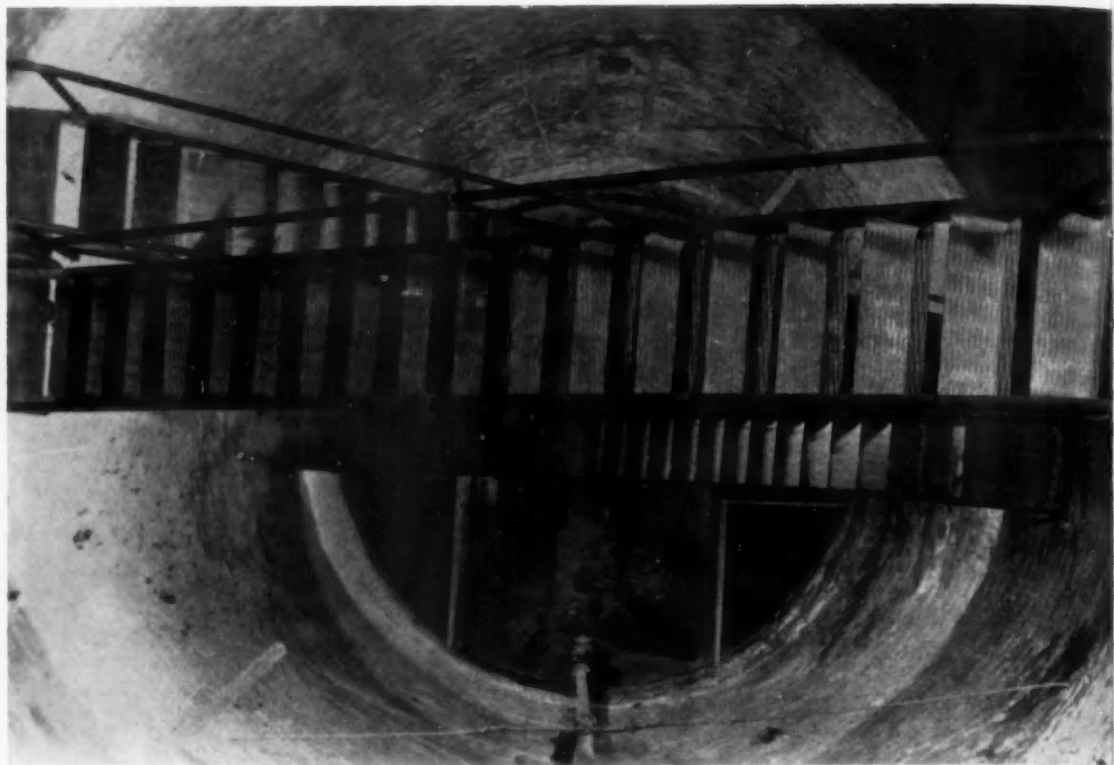
killed or frightened away; by the end of 1875, there were only a few stray animals on the plains. Without buffalo to eat the grass, Western Kansas became an immense pasture land for range cattle.

A stage coach driver, D. R. Green, famed for the speed and dependability with which he drove, was nicknamed "Cannonball" Green. In September, 1884, when a group of men organized a town, they called it "Greensburg" to honor the stage coach driver. The route he traveled is now U.S. highway No. 54, but it is known locally as "Cannonball highway."

To encourage homesteading, Congress passed a law in 1885 forbidding the fencing of government land by cattlemen. Towns sprang up all over the plains country around railroad stations, land values soared, town lots sold at a premium, and two, three and four-storied brick or native stone buildings were erected.

Greensburg was a trading point with a few hundred inhabitants. In February, 1886, a group of men appeared before Governor John A. Martin with a petition that Greensburg be named county seat of the newly organized Kiowa County, so named because of the Kiowa Indians who had migrated south to present Kansas with their head chief, Satank, from their home north of the Black Hills in South Dakota. Newcomers flocked to Southwestern Kansas and Greensburg by the summer of '86 boasted a population of 2,500.

The following year the citizens, encouraged by the phenomenal growth of their town, decided to have a waterworks system



LOOKING INTO THE GREAT HAND-DUG WELL.

that would provide an abundance of water for all purposes, especially for household use, fire protection and the needs of the Santa Fe railroad. In June they granted a franchise and right of way to the Greensburg Water Supply and Hydraulic Power Company.

A gigantic well was considered the only adequate source of water in the prairie country. Experts informed the citizens that there was an enormous ground flow under Greensburg, which is about twenty miles from the Arkansas River. Perhaps those early day citizens of Greensburg dreamed of a metropolis in the prairie country. Perhaps they wanted to prove to the world that there was plenty of water in Kansas.

Jack Wheeler of Nickerson was the supervisor of construction of the well. He was a man of fifty and was head of the water department on the Santa Fe railroad between Wichita and Greensburg. Mrs. Wheeler traveled with her husband and

cooked for the workmen. The boss refused to hire any man under 21 to work on the well, as he considered it too dangerous.

On the ground level, a stone casing was built on a circular platform, 32 feet in diameter. As the earth was removed in a half barrel pulled by a mule and the well was deepened, the casing was lowered inch by inch into the cavity. By the time the desired depth of 109 feet below ground level was reached, the stone casing was complete and in place.

Water filled the casing to a depth of 25 feet. It was pumped into a large wooden reservoir on a tower 100 feet tall. Visible for miles in every direction in that level country, the tower served as a landmark and guide to travelers in the days before marked highways. Having been built at an estimated cost of \$75,000—a large sum of money at that time, especially in Kansas—it was the pride of Greensburg. It served its purpose fully. The water level of the

well has never been lowered more than two inches by pumping, no matter how hard or long it was pumped.

But there was a general panic in 1893 and, in Kansas, another drought. The bubble burst in Southwestern Kansas and the great boom period collapsed. Homesteaders sold their land to cattlemen and in a few years cattle ranching on a big scale returned. The Santa Fe railroad tore up its tracks and departed. The huge water tower was sold to Alva, Oklahoma, but the large well remained and continued to supply the citizens of Greensburg with water.

In time, Southwestern Kansas recovered from its setback. By 1932 the huge well could no longer serve the community. A new water system was installed. The well remained idle until 1939, when it was opened to the public as a tourist attraction.

Greensburg now has a population of 1,500. Around it are big cattle ranches, vast wheat fields, and oil wells.

Because the citizens realize that the huge man-made well had a major role in the growth of their city and county as well as Southwestern Kansas, they have a great deal of sentiment for the well. A canopy was erected over the opening. Many view the well through a glass section in the cover. Braver ones descend a steel stairway which leads to the water level, eighty-four feet below the ground level. It is estimated that water flows through the well at the rate of four miles an hour. In the recent wet years, the water level has risen and the platform, once at water level, is now under three feet of water. Pumps are unable to lower the level.

The entire structure is in excellent condition and the water supply is not only plentiful but fresh and pure. More than fifty thousand tourists have visited the well annually since it was opened to the public. Regardless of the weather, visitors are there every day. The registration book proves that people from every state in the United States and many foreign countries have stopped at Greensburg's big well. It is of particular interest to engineers.

QUEEN HILL QUARRY

by DAVID C. BROWN

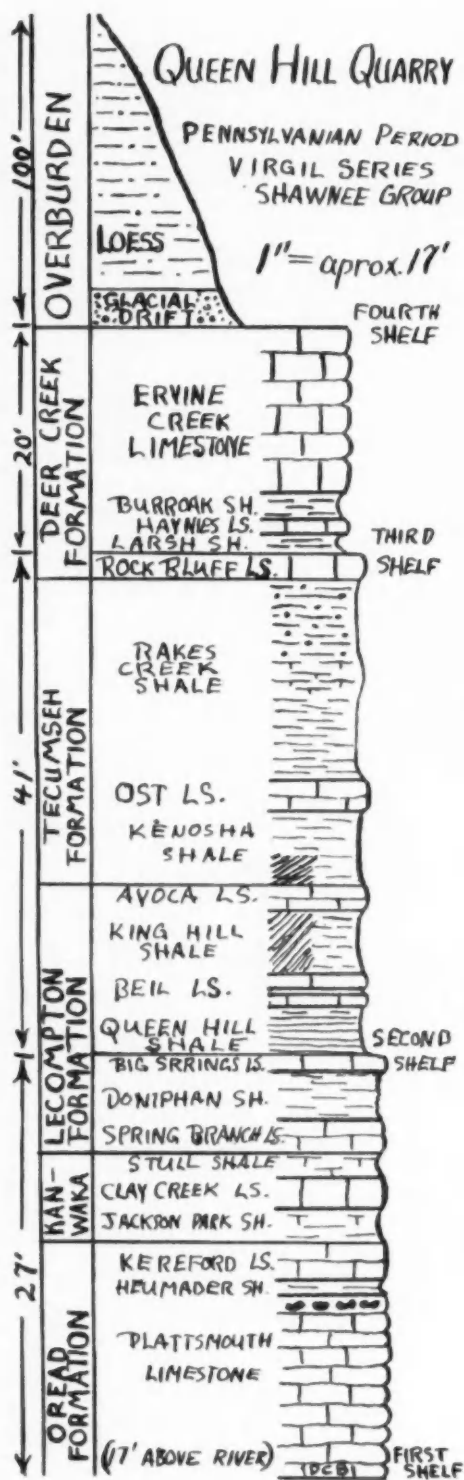
QUEEN HILL QUARRY is located on the west bank of the Missouri River, about thirty miles south of Omaha. It is approximately at the site of the former village of Rock Bluff—named for the high bluff of limestone that rose above the river at Queen Hill. For a number of years the Corps of Engineers has quarried limestone here for use in levee and channel control work along the Missouri. The stone is loaded on barges and transported up or down stream as needed. Queen Hill Quarry has been the happy hunting ground for the Nebraska Mineral and Gem Club. Sticky fingers collect booty that ranges all the way from calcite crystals to sharks' teeth.

The strata of the quarry illustrate a peculiar phenomenon of the Pennsylvanian period. The sea bottom at that time rose and fell, causing the series of alternating limestones and the more shallow deposits of shale.

Interesting items have been found in the strata illustrated in the accompanying section.

The lowest stratum of interest is the Plattsmouth Limestone. Herein can be found especially fine, brilliant calcite crystals—most attractive though small is size. The most interesting find in the Plattsmouth Limestone is the meager amount of sphalerite. Some dandy crystals have been found, quite black and small. We are waiting for future quarrying operations at this lower level to give us additional finds. Marcasite sometimes presents a definite peacock effect on fractured surfaces; but, so far as we know, no choice specimens have been found in this area. Consequently our interest has not been especially aroused by this item. Near the top bedding plane is a layer of chert nodules, some of which would be suitable for lapidary work. We have been trying to find traces of celestite in this area, but so far we have been quite unsuccessful.

Farther up in the column is the Spring Branch Limestone. Fossils in this bed are

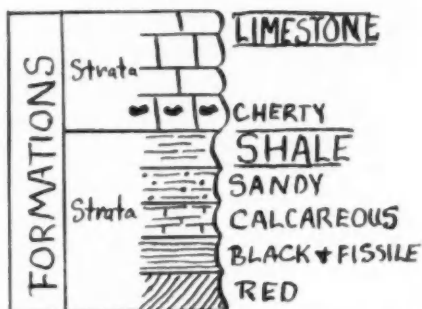


excellent and very clear if they can be chipped out without being fractured. They include *Allorisma* clams and the brachiopods *Neospirifer*, *Dictyoclostus* and *Derbya*. Fine quality flint, quite dark and speckled with minute white fossil shells, can be found. One of the more popular items consists of the many vugs of calcite, some of which are very large. There is usually a secondary crystallization. The primary crystals, which we call "root beer xls" because of the coloration, are of a cream to buff shade with a darker surface, sometimes quite brown and strongly iridescent. The secondary or inner crystals are always brilliantly water-clear.

The bed immediately above is the Doniphan Shale, wherein can be found a great abundance of fossils: *Derbya*, *Chonetes*, *Composita*, *Wellerella*, *Neospirifer*, *Punctospirifer*, *Linoproductus*, *Juresania*, *Dictyoclostus*, and some clam shells, especially *Allorisma*. Crinoid joints are quite common. This shale is very friable and upon being exposed to weathering deteriorates rapidly, leaving the fossils to be picked out with the fingers.

Just above the second shelf is our favorite, the Queen Hill shale. When freshly broken it is black and waxy and splits, with some difficulty, to reveal beautiful octahedrons of pyrite and some clusters of marcasite. The pyrite crystals occur as octahedrons, octahedrons truncated by a cube, cubes, and "sunbursts." To clean these crystals we use a pin and then a thorough scrub-

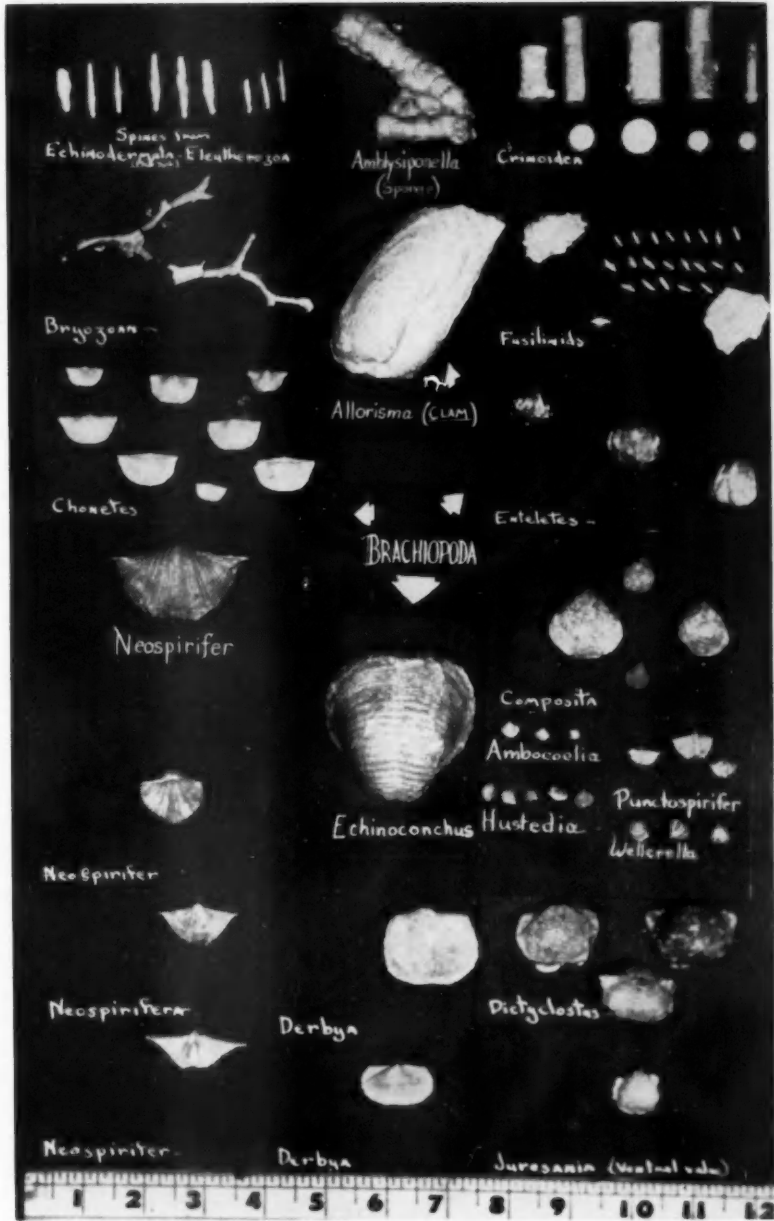
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(Taken from The Geological Section of Nebraska by Condra + Reed.)

bing with a stiff brush. They are about the most popular find at the quarry. This is the only bed known to have vertebrate

by our group. In the fall of '53, I had the good luck to find a beautiful, complete, fossil fish about eight inches long in the

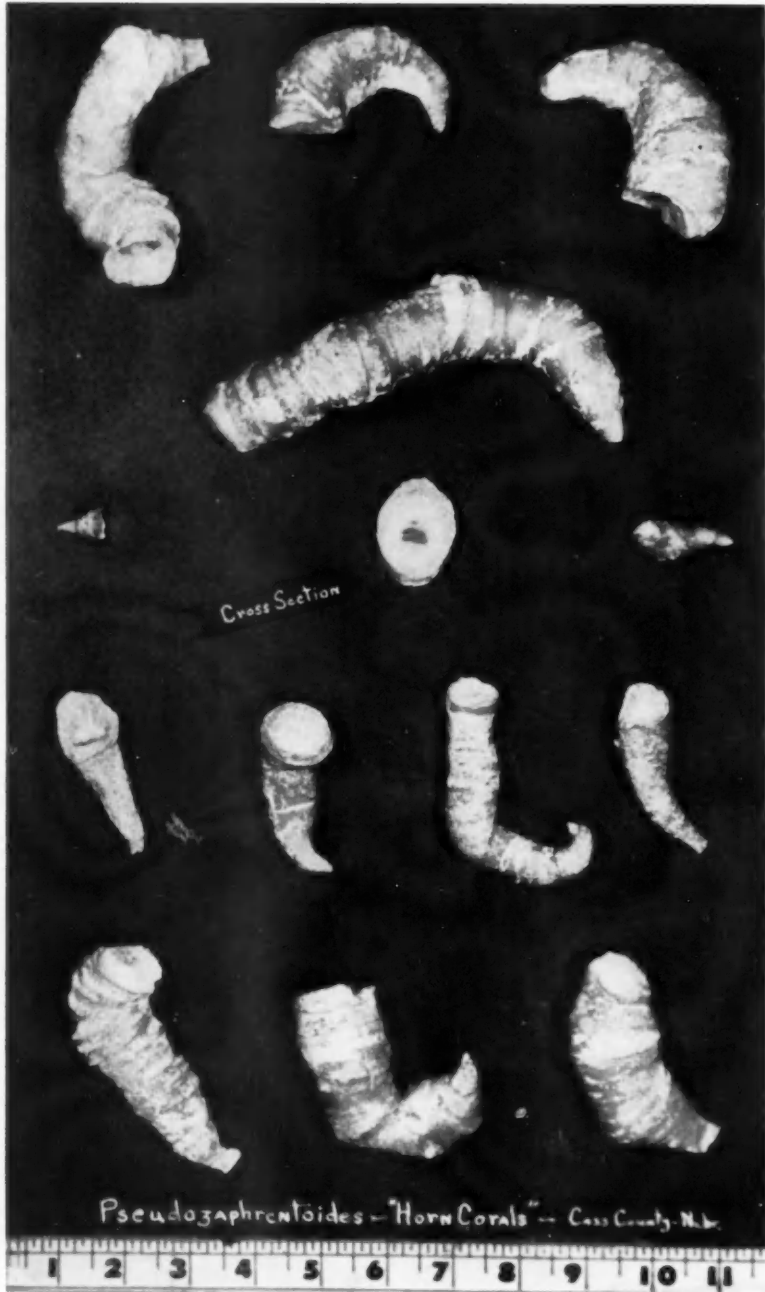


TYPICAL FOSSILS FROM QUEEN HILL QUARRY

fossils. Herein are found many evidences of fish and sharks—fish fins, scales, small bones, shark cartilage, and shark teeth. A dozen or more shark teeth have been found

Queen Hill Shale. (An article concerning this appeared in the March-April, 1954 issue of EARTH SCIENCE.) The fossil fish attracted considerable attention and was

given to Dr. Shultz at the University of Nebraska State Museum. This last fall Mr. *das?*) measuring about fifteen inches in length. The piece showed the head, gills,



FINE HORN CORALS FROM QUEEN HILL QUARRY

Hufford, vice president of the Nebraska Mineral and Gem Club, found the impression of the front third of a shark (*Clad-* and pectoral fins perfectly imprinted in the shale. This was also presented to Dr. Shultz at Morrill Hall.

Somewhat higher in the quarry we find the last stratum of interest—the King Hill Shale. This is a bluegreen shale in which we discover countless numbers of fine, large "horn corals" (*Pseudozaphrentoides* and *Lophophylum*). These pieces fracture easily; the accompanying photo shows the few really good specimens we have been able to gather from the solidly packed beds exposed at the quarry. Cross sections of the horn corals can be polished and dyed, and can be made very beautiful, since they show the original minute structural detail. Some authorities credit them to the Beil Ls., but from our observations we believe that they do occur in the King Hill Shale.

Except for small amounts of lignite coal and occasional calcite crystals, we find nothing of importance in the upper strata.

Other rare finds in fossils include two trilobite fragments and an excellent sponge, *Amblysiphonella*. One of the trilobite fragments is cemented on the valve of a *Chonetes*. This trilobite has been tentatively identified as *Ameura*.

To illustrate what can be found in fossil varieties, I have accumulated over two hundred specimens, representing some twenty-five genera, in the past year.

This quarry is operated Monday through Saturday. There is no activity in the winter, however, because the barges used to transport the rock are taken out of circulation before the first freeze. Quarrying operations are then shifted to King Hill, a mile and a half south of the Queen. Consequently, "warm weather" rockhound work should be restricted to Sundays.

A word of caution—due to the loose rock on the cliffs, there is much danger from falling rocks and frequent small "avalanches."

The club has made many field trips to this quarry, thanks to the hospitality of the Corps of Engineers. Almost any Sunday finds some members of the club searching the site to check what fresh material has been exposed by the week's quarrying activity.

VERMONT COPPER

by MRS. JULIAN WETHERBEE

MANY PEOPLE THINK OF VERMONT as an agricultural state, and hence are greatly surprised to learn it is also a great mining state, where marble, talc, granite and asbestos as well as copper are constantly mined.

Early in the 1800's copper was discovered in several places and around 1830 mining started at Corinth, Vershire, Thetford and Strafford, all in Orange County. The Elizabeth mine is in the town of Strafford on what is called Copperas Hill. It is located in the southeasterly part of the county. The town of Strafford was chartered in August, 1761 and divided into 70 shares. (Towns in Vermont are not villages, but townships.)

Orange county is quite hilly but with no large mountains. The Ompompanoosuc River pursues a serpentine course through the town of Strafford. The rocks underlying are of the calciferous mica schist formation. Evidence of the glacial period is found in the moraine terraces and the large boulders scattered over the county.

From about 1830 copper was mined in at least two mines in Strafford. Smelting furnaces were erected, and for a while quite a profitable business was carried on. As the mines were worked deeper the copper ore became richer, and with this richer ore the company built a new smelting furnace.

In the early part of the Civil War, copper was in great demand and the price reached 55¢ a pound, so mining became very profitable. During the war 100 men and boys were employed in working the mine and in the mill. The ore was shipped to Bergen Point, Baltimore, Point Shirley and other places.

When the war ended, the Government had almost two years' stock of copper on hand, and no further use for the metal, so due to the low price, mining of copper at Strafford was abandoned for several years.

In 1872 one of the mines was worked again and the ore was shipped to Malden,



NEWEST TUNNEL ENTRANCE

Massachusetts, where sulphur was extracted for sulphuric acid. After 1872 Mr. Isaac Tyson* of Baltimore became interested in the copper mines. He erected a smelting furnace at the Elizabeth mine and in about 1880 pushed the mining and smelting of copper. Later the work was abandoned.

In 1941 the Vermont Copper Company reopened the Elizabeth mine and built a floatation plant. All the ore taken from the mine goes through this plant. Since 1943 three shifts, six days a week, work in the mine, while three shifts, seven days a week, work in the mill. Some 215 employees are working for the company now. In June 1954 the mine was taken over and is now being operated by Appalachian Sulphides, Inc.

About 25,000 tons of ore are treated a month, which ore averages less than 2% copper, yielding 8,000,000 to 10,000,000 lbs. of copper a year. The mine has about

*For more than half a century Tyson was a prominent name connected with the mining business in the East. Mr. James W. Tyson was president of the Tyson Mining Company, located at the northwest corner of Charles and Lexington Streets in Baltimore, from 1867 to 1907; while a Mr. Jesse Tyson was president of the Baltimore Chrome Works.

8,000 feet of drifts, some 700 feet below the surface; also two open pits, one being mined at the present time. There are two tunnels going into the hill, with tracks for their electric driven trains. The tunnels and drifts are lighted by electric lights — a far cry from the olden day, when the men working in the mine used candles held near their work by a chunk of clay.

The labor is all native, coming from the surrounding villages, as far as 20 to 25 miles, each day or night, to work in the mine or in the mill.

Mr. C. B. Benson, assistant manager at the Elizabeth gave us permission to go through the floatation plant. Now for those who have never been through a floatation plant, I will try to describe what we saw on our trip.

First the ore, when brought from the mine in cars, is dumped into a chute. This feeds into a large crusher. The ore is then taken on a conveyor belt to a second crusher, where it is crushed finer. Then, after being screened, the coarse part is fed back into the second crusher the second time. After this it goes on a conveyor belt to a ball mill, to come out as fine as dust.

From the ball mill it is taken to the floatation cells, where chemicals are used with water to help separate the copper from the iron and other minerals, as well as the waste. The iron part is then put through a separate floatation process.

The copper concentrate goes into two large settling vats, more than 14 feet across. Later it is fed to a big drying drum. As the drum turns it dries the concentrate, and as it dries, it falls off into a bin, ready to be loaded into trucks for hauling about ten miles to the railroad, where it is shipped to smelters in New Jersey for final reduction into copper.

The concentrate is 22% or more copper. Some silver and iron is also taken out in the floatation process. The waste product of sulphur is sold to a paper company in New Hampshire. This raw material is 35% sulphur.

This process of extracting copper from

the ore is different from the process used back in the years of 1830 to 1880. Now more modern methods speed up the production of copper from the low grade ores.

The ore in the Elizabeth mine is not what is termed native copper, but is chal-

copyrite, pyrrhotite and pyrite. On the dumps can be found some calcite, kyanite and the other ores from the mine. This mine has been worked off and on for over 100 years and there is expectation of many more years of profitable production.

Man-Made Diamonds Are No Longer A Scientist's Dream

by HERBERT B. NICHOLS

MAN-MADE DIAMONDS, the climax to a 125-year effort to duplicate nature's hardest and most glamorous substance, were displayed recently, for the first time, by scientists of the General Electric Research Laboratory, working under the direction of Dr. C. Guy Suits. The tiny diamonds were made from a carbonaceous material subjected to extreme pressures and temperatures.

The largest stone measured 1/16 of an inch in longest dimension, and in announcing what he termed "one of the landmarks in man's search for knowledge about his world," Dr. Suits warned that "any conclusion we are about to make diamonds of a size and quality suitable for gem use is decidedly premature." Diamonds for jewelry must have special characteristics of size, color, and crystal perfection.

"On the other hand," he added, "if the present high cost of making diamonds can be reduced, the primary application of man-made diamonds will probably be in industrial tools for cutting and polishing." Diamonds of any quality, regardless of size and color—including diamond dust—are useful abrasives in industry. He emphasized that the crystals displayed were not "imitation" diamonds or "diamond-like." They are purely and simply diamonds, exactly the same as are taken from mines of the Belgian Congo and Brazil.

The hardest substance known to man, diamonds are mined at the rate of about

2½ tons annually. Approximately 90 per cent are imported by the United States. Of the diamonds of industrial grade, some are stockpiled for defense purposes, but the major portion goes into tools that cut, saw, or polish other hard materials, no small proportion of which find their way into the lapidary and gem cutting trade.

These artificially made diamonds were positively identified by x-ray inspection, chemical examination, and hardness tests to be genuine. Under hardness tests, they proved capable of scratching anything, even other diamonds, and thus are the first man-made substance known to scratch other diamonds.

Making diamonds was the result of more than four years of intensive research by Laboratory scientists under supervision of Anthony J. Nerad, manager of the Mechanical Investigations Section. "G-E's success was no accident," he said, "but a part of a general program for examining various materials subjected to combined high temperature and pressure."

In the final process, employed by Dr. Herbert M. Strong, a carbonaceous compound was subjected for many hours to a measured pressure some 53,500 times greater than atmospheric (roughly 800,000 pounds per square inch). That run, in the Laboratory's new 1000-ton press, yielded a crystal nearly a sixteenth of an inch in longest dimension.

"After opening the pressure chamber,"

said Dr. Strong, "and while attempting to polish the now solidified matrix, there appeared what we were seeking, a core of superhard matter that refused to wear away under the action of the polishing wheel. With considerable excitement and expectation I removed the crystal from its surroundings, and tried one of its sharp points

1,500,000 pounds per square inch. This pressure is roughly equivalent to the "squeeze" physical scientists have computed for points 240 miles beneath the earth's surface. Using this equipment, late last year Dr. Hall developed a process that produces diamonds in a matter of minutes. Hall's diamonds, however, are smaller, but are



Shown above is the largest diamond yet made in the General Electric Research Laboratory, by Dr. Herbert M. Strong, physicist. About 1/16th

of an inch in longest dimension, it has been photographed beside a standard, diamond, high-fidelity phonograph needle to show relative size.

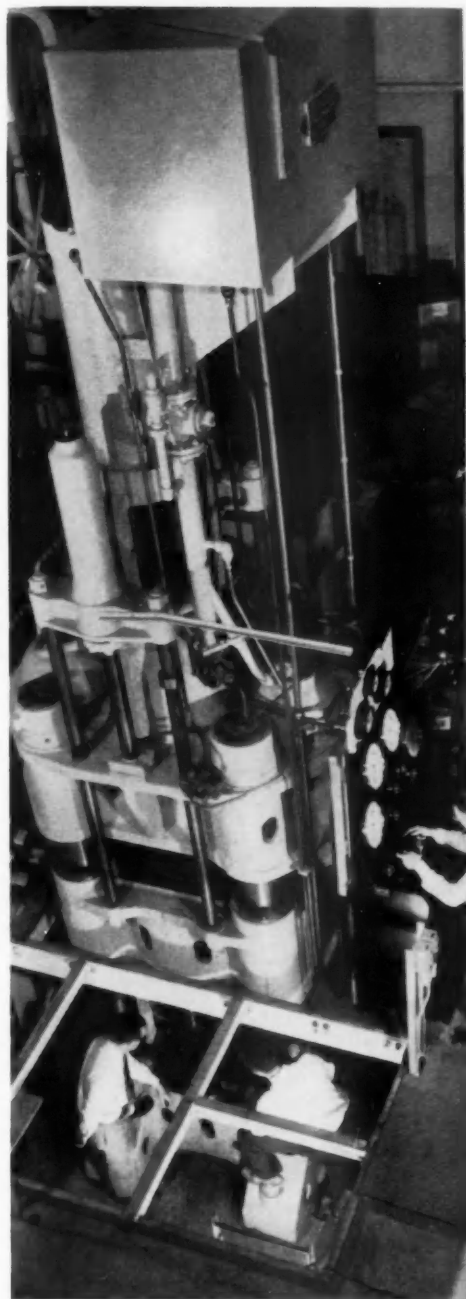
on sapphire, silicon carbide, and boron carbide. This 'diamond,' I could call it now, easily scratched all three."

In a similar process, Dr. Tracey Hall employed temperatures in excess of 5,000 degrees F., and pressures of more than

often produced in solid clusters. Single runs have produced up to 1/10 of a carat.

To confirm the results, two independent teams of scientists from other departments in the Laboratory have repeated the experiments in each case with success. All in all,

the various processes for making diamonds have been repeated successfully more than



General Electric Research Laboratory's 1000-ton press for achieving high pressures (100,000 atmospheres or 1.6 million pounds per square inch [psi]). This is the apparatus in which GE man-made diamonds were first produced.

100 times. Many of the first diamonds produced were deliberately destroyed during essential testing. For example, many crystals had to be burned to determine their carbon content.

Dr. Marshall, in the course of discussing laboratory tests for diamonds, explained that x-ray examination is perhaps the most conclusive single test, because every crystal from common salt to precious jewel has its own distinctive x-ray "fingerprint," or diffraction pattern. It is easy to recognize the pattern of diamond because no other known material comes anywhere near matching it.

The true status of previous attempts to make diamonds is difficult to determine with certainty. Principal claimants of success were a Frenchman, C. Cayniard de la Tour (1828); an English experimenter by the name of Hannay (1880); the French scientist H. Moissan (1894); and a British scientist, Sir Charles Parsons (1907-1920), who subsequently expressed doubt about his own results.

Repeated attempts by many researchers to reproduce the results claimed by these earlier investigators have failed, and careful analyses of existing records by reputable scientists have not confirmed any previous claims that diamonds were actually produced in the laboratory.

Certainly no sure method of repeatedly making diamonds has ever been announced before. In perfecting the long series of laboratory improvements in their struggles to achieve combined high pressure and high temperature, General Electric scientists gained valuable help from nature, particularly from studies of diamonds found in Arizona meteorites, which information should be of particular interest to rock-hounds.

The Christmas cover makes this an appropriate issue with which to start gift subscriptions, three years \$5, one year \$2.

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OF ALL THE URANIUM bearing minerals known, only a few are found in sufficient quantities to make their mining and extracting profitable. Of these, only two minerals, pitchblende and carnotite, are important sources of our metallic uranium at the present time.

The principal deposits being mined in the United States today are located in the sandstone of the Colorado Plateau in Arizona, New Mexico, Colorado, and Utah, as well as in limestone in New Mexico. It also occurs in phosphorite, in shale, in coal or lignite, or in veins.

of uranium. Nevertheless, the large tonnages of these materials indicate that sometime in the future they may be an important source.

The mining of uranium differs little from that of other mining operations. U 235 (the radio active isotope of uranium) is never present in such sufficient concentrations as to make any precautionary measures necessary. Therefore the method or type of mining operations is governed solely by the matter of practicability and other engineering problems present at the site of the deposit. All three of the com-



STRIPPING OPERATIONS AT RATTLESNAKE MINE IN UTAH.

It occurs in granitic pegmatites in relatively small amounts in comparison with the amount in other types of deposits. Phosphate deposits in southeastern United States are an important immediate source of uranium as a byproduct from the production of fertilizer. Advances in technology will be required before the coal, shale, and igneous rocks can compete economically with other materials as sources

mon methods of mining: shaft and tunnel, slope and drift, and surface stripping, are commonly employed. The accompanying pictures (through the courtesy of Continental Uranium, Inc.) will aid those who have never been privileged to visit these operations better to visualize the process.

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AMERICAN FEDERATION CONVENTION

THE 8TH ANNUAL CONVENTION of the American Federation of Mineralogical Societies was held in Washington, D.C., on September 27 - 30, 1955, at the Shoreham Hotel. The delegates and visitors were very graciously entertained by members of the Eastern Federation, serving as official hosts on this occasion.

More than fifty dealers displayed their wares in the dealers' exhibit hall and the materials for sale were of exceptional high

American Federation, with J. Lewis Renton presiding, was held on Thursday, September 29. It was voted unanimously to hold the 1956 conclave with the Midwest Federation at the Twin Cities (Minneapolis and St. Paul) in Minnesota, with the Minnesota Mineral Club serving as hosts, early in the month of July. The meeting will be held at the Minnesota State Fair Grounds, where ample buildings and facilities of all kinds are afforded.



DEALERS' EXHIBITION HALL AT THE WASHINGTON CONVENTION (photo by Alvin Y. Gardner, Alexandria, Virginia)

quality. The club and individual exhibits shown in another hall were also excellent, and compared favorably with those in other parts of the country. The lecture programs were good and well attended.

The annual business meeting of the

It was also voted to continue the committee on car emblems and lapel buttons, and the committee was instructed to proceed to make the lapel buttons available to the Clubs and Federations wishing them on the same basis as the car emblems.

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President: Arthur L. Flagg,
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Vice President: Harry L. Woodruff,
Washington, D.C.

Secretary: Hazen T. Perry,
Minneapolis, Minnesota

Treasurer: Vincent Morgan,
Boron, California

Historian: Ben Hur Wilson,
Joliet, Illinois

A vote of thanks was extended at the close of the meeting to the Eastern Federation for their fine hospitality and the splendid way in which the entire convention was managed.

OLD TIMERS MEET

Members of "Ye Old Timer's Mineral Club" present at the convention gathered in the hotel lounge at 2:00 P.M. on Thursday, September 29, for an informal meeting which was greatly enjoyed by all who put in their appearance.

The Old Timer's Club is affiliated as an independent society of the American Federation. Following the introduction of the various members present, memorial services were held for our beloved member, Charles Preston, who passed away last June, at which his obituary sketch was read by O. T. Ben Hur Wilson, and all present stood for a moment of silent meditation at the close.

Reminiscences and pleasantries were exchanged by a number in the group, and it was voted to send felicitations to Paul Vander Eiche, editor of the *Club News Bulletin* who was unable to be present on account of distance. The new 1955-56 membership directory is now out and will prove a valuable aid for our members in carrying on their correspondence with each other.

All present were urged to send in at least one new member during the year.

NEW "HALL OF EARTH"

Nearly all in their travels pass through Chicago occasionally. Here they may find many worthwhile things to visit and to see, but in so far as the earth scientist is concerned, perhaps nothing furnishes so much of interest as the many wonderful exhibits in the various halls of the Chicago Natural History Museum, (formerly the Field Museum), located down town, right on the edge of the "loop".

Besides the mineral and paleontological halls, there are the jade room and the gem room, and more recently an entirely new "Hall of Earth", (officially named the Hall of Physical Geology), has been unveiled, which promises from an educational standpoint to be the most valuable of all.

In the new hall are presented all of the basic known facts about this planet, such as its origin, its structure and composition, what its interior is like, the nature of its surface, its age, how and why its face is constantly changing, the forces that act upon it from within and without. This information is visually transmitted in a series of 37 large exhibits.


Grouped in the center of the hall are four dramatic and spectacular dioramas. In three of these, the light automatically changes to simulate variations in appearance outdoors that occur with the changing time of day. One of these dioramas illustrates the effect of a stream erosion through a model of a scene in the Grand Canyon of Arizona, with the Colorado River as erosional agent.

Another diorama shows what a glacier is like, how it acts, and what it does to topography. The third diorama illustrates the processes by which volcanoes come into being and their activity and its effects.


The fourth diorama, representing the interior of a cave, demonstrates the solvent action of ground waters. These exhibits were created by George Marchand, well-known sculptor of West Seneca, New York, who several years ago also built 10 dioramas in the museum of prehistoric invertebrate life of millions of years ago.



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One of the great finds of the present collecting season was made by Mrs. Adolph Ruonovarra of Lake Linden, Wisconsin. The lucky lady found a huge carnelian agate weighing 42 pounds. While larger agates of the vein type have been reported in the past, none of this size has come to our attention in recent years.

The stone was found at High Rock Bay on the Keweenaw shoreline while she and a group of friends were agate hunting in the region, which has long been noted for



MRS. RUONOVARRA AND HER AGATE (photo courtesy of Chicago Tribune)

the large number and quality of stones found there. However, due to the over-collecting by zealous rockhounds they are now becoming quite scarce.

It is greatly hoped that Mrs. Ruonovarra will be willing and able to exhibit this great find at the Midwest Federation Convention in the Twin Cities next summer, where everyone will be able to see and admire it.

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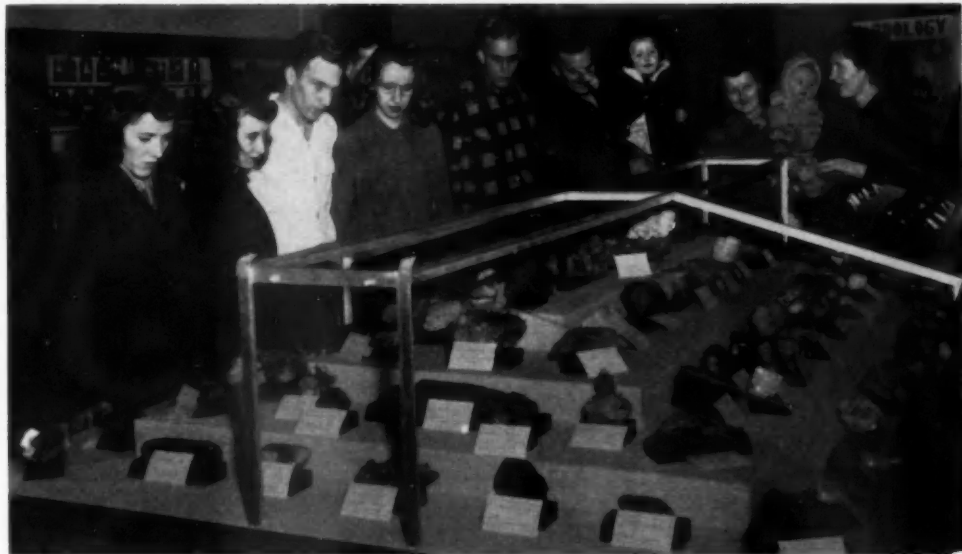
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RARE COLLECTION OF MINERALS AT PARSONS COLLEGE.—The collection in the photograph represents a portion of the larger and more colorful mineral specimens assembled by the late Dr. H. C. Whiting of Fairfield, Iowa. This display and the remainder of the collection are permanently housed in the Geology Department of Parsons College, Fairfield, Iowa, through the

generosity of Mrs. Whiting. The collector spent a number of years in the Orient as a medical missionary, and was thus afforded an opportunity to collect from unusual localities. Many specimens were also obtained by trading southeastern Iowa geodes with collectors from other localities. Collectors passing through Fairfield (U.S. Route 34) are invited to stop in and visit.

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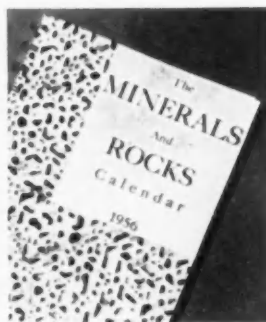
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Midwest Club News

BERNICE WIENRANK, *Club Editor*

4717 North Winthrop Avenue
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MARQUETTE GEOLOGISTS ASSOCIATION planned to be host on October 16 to the other Chicago clubs for a field trip to the Mazon Creek area near Joliet, Illinois. This region is an excellent source of carboniferous fossils which have been exposed by surface coal mining. Following a picnic lunch in a nearby park, Dr. Frank Fleener, geologist, was scheduled to give the societies an informal talk on "The Formation of Fern Fossils."

*

MICHIGAN MINERALOGICAL SOCIETY'S most recent gift to the Cranbrook Institute of Science is a huge datolite nodule, conservatively valued at \$100, from the Iroquois mine. In the past MMS has donated thousands of dollars worth of fine mineral specimens to the Cranbrook Institute.

*

EVANSVILLE LAPIDARY SOCIETY enjoyed a late summer picnic at Angel mounds near Newburgh, Indiana. These mounds were built by early Indians and many archaeological treasures have been taken from them.

*

CHICAGO LAPIDARY CLUB on September 8 heard Henry Cox talk on "Coral." Mr. Cox, an amateur gem carver, prefers the organic gem materials for his art. He has made a study of the properties and history of jet, amber and coral, and has written interesting articles about each material.

*

GEOLOGICAL SOCIETY OF MINNESOTA on October 2 toured the Whitewater State Park and the Root River Valley to study the geology and topography of the driftless area of southeastern Minnesota. The bold and picturesque bluffs of the Whitewater and Root River valleys, from the Jordan sandstone below to the Onocota dolomite at the top, represent deposition during a hundred million years.

*

CHICAGO ROCKS AND MINERALS SOCIETY heard Dr. George Otto on October 8, speak on "New Slants on the Geology of Chicago." Dr. Otto, one of the country's foremost geologists, reviewed recent data about the geology of Chicago and discussed the hypotheses advanced to explain the new findings.

*

MINNESOTA MINERAL CLUB will be host to the 1956 convention of the American Federation of Mineralogical Societies. The convention will be held in the Twin Cities (St. Paul and Minneapolis, Minnesota) during the early part of July, where it will be housed in the Minnesota State Fair Ground's buildings, which are very spacious and have their own built-in display cases.

CENTRAL IOWA MINERAL SOCIETY recently held a group discussion on "Uranium Minerals and Ores." Samples of the following uranium minerals and ores were on display: uranophane, uraninite, uranotile, gummite, torbernite and carnotite. Everyone present was given an opportunity to test the specimens with a Geiger counter.

*

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS was scheduled to hear Dr. Wilbur L. Hoff, chemical engineer, on November 4, lecture on "Radioactivity." The lecture was to include the history and early discoveries of radioactivity and the structure of the atom; comments on chemical and atomic reactions; atomic bombs and the psychological effects of radiation; and the uses of atomic energy and radioactivity in power reactors and medicine.

*

WISCONSIN GEOLOGICAL SOCIETY reports that the most frequent question asked by the more than 81,000 people who viewed its exhibit of gems, minerals and fossils at the Wisconsin State Fair during August, was: "Where is your uranium?" The display received many favorable comments and created much interest in the activities of the society.

INDIANA GEOLOGY AND GEM SOCIETY recently panned for gold in Sycamore Creek in Morgan County, Indiana. One lucky member found a small piece of native silver among the gold flakes in her pan.

*

CENTRAL ILLINOIS ROCKHOUNDS exhibited rocks, minerals and gems at the Eastern Illinois State Teachers College during the last two weeks of September. The college invited CIR to put on the show as an educational feature for its students.

NEWS OF OTHER SOCIETIES

WYOMING STATE GEM AND MINERAL SOCIETY has assisted in the organizing of three new gem and mineral clubs at Sheridan, Worland and Greybull, Wyoming. The new clubs have not yet chosen names, but correspondence will reach them if addressed to: Mr. Donald Gray, 513 S. Linden, Sheridan, Wyoming; Mr. R. H. Steiner, 722 Thomas, Worland, Wyoming; and Mr. Oscar R. Shoemaker, Greybull, Wyoming.

*

SAN DIEGO LAPIDARY SOCIETY has voted to buy a lot on Linda Vista Road near Josephine Street in San Diego, on which it plans to build a clubhouse and workshop.



PHOTOGRAPHS IN THE FIELD OF GEOLOGY as well as in the fields of plants and animals are desired for the 11th annual nature photography exhibition to be conducted by the Nature Camera Club of Chicago in co-operation with the Chicago Natural History Museum. There will be awards of medals and ribbons in divisions for prints and color slides. Entry forms and information may be had from Willard Farr, 6024 Dakin Street, Chicago 34, Illinois. Entries close January 26, 1956. (From a photograph of Barrel Cactus shown by Floyd Norgaard at a previous exposition.)

OKLAHOMA MINERAL AND GEM SOCIETY'S junior members, under the leadership of senior-member George Smith, recently made a field trip to an old zircon mine in the Wichita Mountains west of Lawton, Oklahoma. Everyone obtained at least several specimens of well-formed, brown zircon crystals.

WICHITA GEM AND MINERAL SOCIETY recently made a three-day field trip to the Wichita Mountains in Oklahoma. There the group collected a plentiful supply of hematite, quartz, geodes, zircon crystals, barite balls and calcite geodes. The zircon and calcite are fluorescent.

SANTA FE GEM AND MINERAL SOCIETY recently heard Dr. John Miller, professor of geology at Lafayette College, discuss "The Mountains of North America." Dr. Miller illustrated his entertaining talk with color slides of his own mountain climbing adventures.

RECOMMENDED READINGS

"Petrified Lightning," by Margaret Romer, September issue of *The Trilobite*. If you would like a scientific treasure, look closely the next time you visit the sea shore, sand dunes or the desert, and you may find a hollow glass tube, from a few inches to several feet long, that was formed by lightning striking the sand.

"Amber," by Amber Ekberg, August issue of *Chips and Facets*. Amber, nature's museum for prehistoric insects, was one of the first substances used by man for ornaments. Miss Ekberg discusses the many myths that have arisen about it.

"Delaware Valley Dinosaurs," by Wilhelm Bock, August issue of *Keystone News Letter*. The giant dinosaurs, *Chirotherium*, roamed the Delaware River Valley 120,000,000 years ago, and today their tracks may be seen on the rocky cliffs of the Delaware River.

"Australian Sapphires," Anonymous, September issue of *Rockbound Call*. In addition to describing the various varieties of Australian sapphires, this article gives detailed instruction on how to cut and polish them.

(A mimeographed list of publications will be furnished on request by the Club Editor.)

BIRTHSTONES

NOVEMBER

TOPAZ has remained the birthstone for November for centuries throughout the world. It is the gem of Sagittarius (The Archer) November 23rd to December 20th.

The Guardian Angel for November is Adna-chiel whose talismanic gem is Amethyst.

The Special Apostle is Mathias.

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The flower is the Chrysanthemum.

Lucky charms ascribed to this month are the Fish, Bee, Eagle, Horseshoe, Horse, Coins, Acorn and Ivy Leaf.

In the middle ages, the Topaz was hung about the neck to dispel enchantment and to ward off insomnia and asthma, and according to the Ancients, its powers increased and decreased with the wax and wane of the moon.

"Oriental Topaz" is the name sometimes given to Sapphires of the accepted Topaz colour, but Golden Sapphires is the correct and better name for them.

Citrine, which is a variety of Quartz, is almost universally called Topaz without any prefix, and when dark in colour, it is known as Scotch Topaz or Cairngorm. The harder and more valuable gem is usually known as "Brazilian" Topaz in order to distinguish it from Citrine or Cairngorm.

In colour the Topaz may be pale blue, pink or colourless but the rich and beautiful golden yellow and brown stones are the most prized and valued by jewellers.

Like the autumnal colouring of November, the Topaz is very kind to brown eyes and in addition is an extremely good wearing stone which helps to make it the most popular of all the reasonably priced gemstones.

The Amethyst of the Guardian Angel Adna- chiel is the birthstone for February.

DECEMBER

TURQUOISE is the accepted birthstone for December but until recent years, the Ruby has been in favour by some nations, including America. It is the Gem of Capricorn (The Goat) December 21st to January 19th.

The Guardian Angel for December is Humiel whose talismanic gem is Beryl.

The Special Apostle is Paul.

The flower is Holly or Snowdrop.

Lucky charms ascribed to this month are the Bat, Beetle, Frog, Pig, Donkey, Elephant and Lincoln Imp.

From the dawn of civilization, Turquoise has found many ornamental and religious uses. Tombs of the earliest Egyptian Kings have revealed beautiful jewels inlaid with Turquoise and even prior to the Christian era they were highly prized by Europeans and were then known as the Turkey Stone and later as the Turkis, owing to the fact that they were thought to come from Turkey, whereas they most likely came from Naishapur in Persia where the finest quality stones were found.

Fine quality Turquoise of rich blue colour and of large size are very rare and valuable indeed but small stones are comparatively cheap. Poor quality stones are apt to lose their colour and turn either green or almost white.

The Ruby favoured by America is the birthstone for July and is mentioned in March and June.

—KENNETH PARKINSON, F.G.A., Hull, England

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